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ABSTRACT

After taking base rate measures of verbal behavior, using a specially devised Story Telling Test and selected sub-tests from the Illinois Test of Psycholinguistic Abilities, 34 children with a mean age of 4-4, attending a year-round Head Start program, were assigned to matched experimental and control groups. The children in the experimental group participated in daily half-hour group sessions for a period of seven weeks during which they were given systematic language training, based on reinforcement principles. The children in the control group continued to participate in the regular Head Start program. Upon conclusion of the training period, all children were re-tested, with the measures used in the pre-test. Significant improvements in scores on the part of the experimental group were found for decrease-in-verb-omission on the Story Telling Test and for the vocal-encoding sub-test of the ITPA. Pronounced sex differences were apparent. Girls in both groups showed improvement for decrease-in-verb omission and for vocal-encoding. Among the boys, only those in the experimental group improved; those in the control group showed some decrease in scores. Discussion of results suggests the possibility of a cross-sex effect. (Author/NH)

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INCREASING VERBAL COMMUNICATION SKILLS IN CULTURALLY DISADVANTAGED PRE-SCHOOL CHILDREN

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Summary

After taking base rate measures of verbal behavior, using a specially devised Story Telling Test and selected sub-tests from the Illinois Test of Psycholinguistic Abilities, 34 children with a mean age of 4-4, attending a year-round Head Start program, were assigned to matched experimental and control groups. The children in the experimental group participated in daily half-hour group sessions for a period of seven weeks during which they were given systematic language training, based on reinforcement principles. The children in the control group continued to participate in the regular Head Start program. Upon conclusion of the training period, all children were re-tested, with the measures used in the pre-test. Significant improvements in scores on the part of the experimental group were found for decrease-in-verb-omission on the Story Telling Test and for the vocal-encoding sub-test of the ITPA. Pronounced sex differences were apparent. Girls in both groups showed improvement. Among the boys, only those in the experimental group improved; those in the control group showed some decrease in scores. Separate analyses for boys and girls revealed that the boys in the experimental group had improved significantly on measures relevant to word production, use of adjectives, and sentence complexity. A comparison of older and younger Ss revealed that the older children seemed to have derived greater benefit from the training program than the younger. Discussion of the results stesses the possibility of a cross-sex effect which, if supported by further research, would point to the desirability of having male teachers participate in Head Start and other pre-school training programs.

Introduction

Verbal communication is basic to educational achievement. The development of verbal skills at a rate fast enough to prepare the child for school has been called one of the significant educational problems in our society (Ervin-Tripp, 1966). It has been recognized that there are radical differences in language skills among various sectors of the population. Lower class families use what Bernstein (1964) calls a restricted code and Hess and Shipman (1965)have demonstrated that this code limits a child's ability to learn new skills. The restricted style of verbal behavior is stereotyped and condensed. It lacks the specificity needed for precise conceptualization. Sentences are short, simple and often incomplete. The content of a sentence is rarely elaborated by the use of subordinate clauses, simple conjunctions are used repetitively, and the syntactic form is poor. The elaborated style of verbal behavior, on the other hand, permits a particularization of communication. It is more differentiated and more precise, thus permitting the expression of a wider and more complex range of concepts. There is a grammatically complex sentence structure which makes full use of prepositions and impersonal pronouns. It is characterized by a discriminative selection of adjectives and adverbs employed in logical syntax. A child from a lower class background enters school and its elaborated language code with a major handicap that becomes increasingly disabling as he gets older (Deutsch, 1965). There is extensive evidence of language retardation among lower class children (Cazden, 1966) and recent years have seen the development of a variety of programs designed to teach language to children whose background places them at a disadvantage from the linguistic standpoint (Brottman, 1968).

Preschool programs ostensibly designed to teach the prevalent language style of elementary school to disadvantaged children, differ in the degree to which they make their efforts systematic and explicit. Programs based on a Child Development Approach (Minuchin and Biber, 1968) take the position that language is but one aspect of the child's psychological development, dependent on many non-verbal emotional and interpersonal factors. This traditional approach holds that language development will benefit when the child's more general psychological development is enhanced through positive interpersonal experiences. At the other extreme are the programs that follow the principles laid down by Bereiter and Engelmann (1966) who maintain that language deficiencies can best be compensated by a systematic, structured program that emphasizes patterned repetition and drill in verbal behavior. Programs operated under the auspices of Project Head Start, dedicated as they are to preparing

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disadvantaged children for elementary school, distribute themselves along this continuum, some making explicit efforts to teach language, while others focus more on interpersonal-emotional experiences. Because of these differences in approach to language training, participation in a Head Start program does not define the nature of the experience a given group of children may have undergone. This makes it difficult, if not impossible to evaluate the effectiveness of "Head Start" when the many individual programs operated under this title are treated as if they represented a common experience for all the children enrolled in them. The ambiguous results of the evaluative study undertaken by the Westinghouse Learning Corporation (1969) are no doubt due to this variability.

Despite this heterogeneity, a study by Cowling (1967) found that 84 children who had participated in summer Head Start programs in seven different schools were significantly more advanced in language than a non-Head Start control group, when both groups entered the kindergarten class of the public school system. The Cowling study highlights another difficulty encountered by investigators of language development; the suitability of measures used. Cowling evaluated the effect of the Head Start program with the vocabulary sub-test of the Metropolitan Readiness Tests and teacher ratings of the children's capacity in verbal expression. A vocabulary test is of questionable relevance when one wants to measure skill in verbal communication and while teacher ratings of this skill are highly relevant, they may lack validity because a teacher usually knows which of the children in the class are graduates of a Head Start program.

When standardized tests, specifically designed to measure language skills are used to evaluate a pre-school group experience, the results are at times discouraging.

A study conducted by Vance (1967) investigated the degree to which a pre-school educational program affects the language skills of disadvantaged children. She compared 18 children who participated in a seven-month experimental training program with 21 children in a control group who remained at home. The training program emphasized language skills as follows: the ability to recognize and name objects, actions, people, and various sounds in the environment; the ability to relate and classify words and ideas; and the ability to express ideas in gestures and words. While the pre-school curriculum was developed with these goals in mind,

there was no systematically explicit effort to offer training in these various skills. Implementation of the specific language skill goals "was woven into the fabric of each curriculum topic" (page 45). "Concepts of color, size, shape, number, texture, and special relationships were included when appropriate in the various curriculum topics" (page 46). At the end of the program all children were tested, using the Peabody Picture Vocabulary Test, six sub-tests of the Illinois Test of Psycholinguistic Abilities, and the specially designed Vance Language Skills Test. These measures failed to show an increase in scores in favor of the experimental group for any of the language goals of the program. In fact, the children who had remained at home (control group) had higher mean scores on tests measuring the ability to recognize and name objects, actions, and people. Some of the mean scores used to measure ability to express ideas in gestures and words also favored the control group. Vance points out that the children in her study, although they had been selected from a population requiring public assistance funds were not "disadvantaged" in terms of language skills since they scored on the average above the age norms on the two standardized tests used. It may thus be that a ceiling effect was operating that attenuated the effectiveness of the training program. At the same time, it may be, as Vance herself points out, that "the curriculum and methods of teaching used in the study may not be the most effective means of teaching language . . . to preschool children. The curriculum revolved largely around free-play experiences, with emphasis on incidental learning. The story and conversation period, the most structured part of the curriculum and considered to be the focal point for the learning of language . . . , was but a small portion of the total in-school experience of the children" (page 159). In other words, when increasing language skills is one aim of a program, it may be important to make language training explicit instead of expecting language to improve as a by-product of other experiences.

It may well be that mothers who attempt to enroll a pre-school child in a special program, but whose application is not accepted, attempt to give their children their privative versions of an enrichment program. This may then lead to the results found by Vance (1967) where the control group exceeded the experimental group on several measures of language development. The not-so-startling fact that a motivated mother can be a very good teacher of language for her pre-school child, was documented in a dissertation conducted by Strickland (1967). Her study was designed to test the effect of a planned parent education program on the language development of five-year old children who attended a kindergarten project

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for lower class, "underprivileged" children. The parent education program had the objective of increasing the frequency and quality of parent-child interaction. The sample consisted of 40 children who were divided into a control group and two experimental groups. The mothers in one experimental group received weekly home visits for a period of 12 weeks, the mothers in the other experimental group were invited to attend weekly group meetings in addition to receiving home visits. The home visits of about 30 minutes were designed to give the mother specific instructions on activities conducive to language development. She was encouraged to work with her child on a specific language activity for at least one half-hour each day. Materials appropriate for language activities were supplied by the program.

Strickland measured the language ability of both groups before and after the experimental intervention. Verbal communication was assessed by selected scales from the Illinois Test of Psycholinguistic Abilities; receptive labeling was measured by the Peabody Picture Vocabulary Test, and comprehension was evaluation by using selected scales of the Pictorial Test of Intelligence. A comparison of the two groups revealed a significant difference on all the measured aspects of language development in favor of the experimental group. While the control group had made some gains on each language aspect, the mean scores of the experimental group revealed a greater increase. This study convincingly demonstrates that language development, as measured by the tests used, can be significantly enhanced by systematic attention to stimulating the child's language and language related activities. It is particularly striking that lower class mothers whose own mean educational level was below that of 9th grade, were able to sustain such a program with minimal preparation and support.

The results reported by Strickland are particularly impressive when they are compared with those reported by Mitchell (1967) who obtained essentially negative results from a 25-session language training program conducted by two trained speech therapists. Her subjects were 58 children enrolled in a summer Head Start program. The criterion measure was the Illinois Test of Psycholinguistic Abilities and the training program made use of the Peabody Language Development Kit. While the control subjects remained in their regular classes, the children in the experimental group participated for approximately one month in training sessions lasting 30 minutes each. Training was administered to small groups of about four subjects at a time. The comparison of pre-test and post-test scores

failed to reveal a significant difference in ITPA total language score, and in only one of the ITPA sub-tests (auditory-vocal sequencing) did the F value reach significance.

While the differences in results reported by Strickland (1967) and by Mitchell (1967) would seem to suggest that half-hour training sessions conducted by the child's own mother for a period of 12 weeks are more efficient for language training than 25 group sessions over a period of one month conducted by trained speech therapists, it should be noted that there is similarity in results for the one criterion measure on which the two studies are comparable. Stickland had used "selected scales of the Illinois Test of Psycholinguistics Abilities" to measure verbal communication. These scales were the Auditor-Vocal Association and the Auditory-Vocal Sequencing Scales. The pooled scores from these two scales were used as the verbal communication measure on which the experimental group had significantly higher mean scores. The sole significant treatment effect reported by Mitchell (1967) was on the Auditory-Vocal Sequencing sub-test of the ITPA. If Strickland's differences in verbal communication scores were largely due to differences in Auditory-Vocal Sequencing, that aspect of her results would be the same as those of Mitchell. Since the Auditory-Vocal Sequencing sub-test of the ITPA depends on rote memory, one effect of these training programs may be to increase the children's attending behavior and memory span which, while crucial for school achievement, do not really represent language development as such.

Inasmuch as Strickland (1967) found differences not only on Auditory-Vocal Sequencing but also on tests designed to assess other aspects of language and cognition, there remains the question why the mothers in her study were more effective than Mitchell's speech therapists in raising test scores of children. The answer may lie in differential effectiveness of the social reinforcement dispensed by the mothers and the speech therapists. When a mother works with her own child she probably expresses occasional praise and approval. Even though they may be non-systematic and not always contingent on desired responses, these social reinforcers are probably very potent because past interactions between mother and child have made mother's responses powerful generalized reinforcers. Relative strangers, such as the speech therapists, on the other hand, are unable to dispense such powerful reinforcers when they emit praise or approval statements. Especially with pre-school children it may be necessary to pair social reinforcement with more concrete rewards

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and the question thus arises whether verbal proficiency can be increased through a training program that explicitly includes the systematic dispensing of such reinforcements.

Recent years have seen the successful application of reinforcement principles derived from learning theory in a variety of practical situations (Ross, 1967). Techniques based on operant conditioning have been used in pre-school settings on such problems as excessive crying and whining, isolate play, excessive passivity, and regressed crawling (Harris, Wolf, and Baer, 1964). In these instances, the selective use of adult attention succeeded in modifying child behavior, demonstrating that such attention is a powerful reinforcer. Laboratory studies have shown that it is possible to modify the rate of vocalization in infants (Rheingold, Gewirtz, and Ross, 1959), the rate of continuous speech in nursery school children (Salzinger et al, 1962), and syntactic style (Bandura and Harris, 1966). Hart and Risley (1968) established the increased use of color names as descriptive adjectives in a group of disadvantaged pre-school children by making access to toys and other pre-school materials contingent upon the use of a color-noun combination. A similar contingency was used by Reynolds and Risley (1968) to increase the verbalizations of a four year-old girl who had an extremely low frequency of spontaneous talking. These studies reveal that adult attention, combined with material reinforcers, can serve as rewards for complex social behavior and language.

A dissertation by Nelson (1968) addressed itself to the question whether the verbal proficiency of pre-school children from low income families could be enhanced by giving speech-contingent rewards for increases in the use of an elaborated language system. Her subjects were 94 pre-school children who attended an eight-week summer Head Start program, conducted by a county school system in the upper-central South. There were 54 female and 40 male subjects; of these 69 were negro and 25 were white. All children came from low income families and were considered "culturally deprived." Sub-groups of three to four children were formed within the various classes and these were given 16 daily sessions of 15 minutes each for a period of four weeks. The experimental sessions centered around toys and the stimulus pictures from the Peabody Language Development Kit. No explicit attempt to teach specific aspects of language was made and in the reinforcement group, reinforcers were delivered contingent on the quality of the verbal productions as judged by the experimenter. Twelve of the sub-groups were given candy or trinkets as rewards when they spoke in a style judged by the experimenter as

increasingly elaborative. Another 12 sub-groups interacted with the same adult for the same length of time. They, too, were give trinkets and candy, but not contingent on the quality of their speech. A third group served as a no-contact control which participated in the Head Start program without interaction with the experimental procedures. All of the children were given individual measures of verbal proficiency before and after the four-week experimental period. These measures were the Copple Sentence Completion Test, the Vocal Encoding Sub-test from the Illinois Test of Psycholinguistic Abilities, and a story-telling device, developed for purposes of this study and consisting of two pictures to each of which the child is asked to make up a story. The quality of the story was scored on a 5-point scale based on its level of elaboration. In addition to these tests, classroom observations of verbal interaction were obtained.

An analysis of the data revealed that while all three groups in the study gained in verbal proficiency from pre- to post-test, the treatment group displayed by far the greatest gain. Nelson (1968) views this as confirming the hypothesis, although, as she points out, the support is somewhat equivocal. The fact that there was an overall increase in verbal proficiency for all groups, including the no-contact group, leads her to suggest that the daily interaction between the subjects from the treatment group with the control subjects, may have resulted in the kind of horizontal diffusion that Klaus and Gray (1968) studied in their Early Training Project. While diffusion of a positive effect is an encouraging phenomenon from the standpoint of social desirability, it serves to confound an experiment and lead to equivocal results. It is thus impossible to tell whether the overall increase in language proficiency found by Nelson was the result of the Head Start program as such, of diffusion of the experimental effect, or some other factor. Inasmuch as diffusion has not been noticed by other investigators, it is an unlikely explanation for the Nelson findings. Blank and Solomon (1968), for example, working with children from one nursery school, found that a tutorial language program designed to develop abstract thinking raised the Stanford-Binet scores of the tutored children significantly more than the scores of the untutored children. Nonetheless, the diffusion hypothesis would bear explicit testing before this issue can be considered resolved.

This review of the research literature on studies of language training for lower class children has highlighted a number of questions that played a role in planning the present study. Among these are the

issues whether language skills of pre-school children improve more when a program includes systematic and explicity efforts to give language training, as against exposing the children to group experiences thought to be generally conducive to psychological and intellectual development. Related to this issue is the question whether language skills improve more when specific responses are systematically reinforced than when the child receives general, largely non-contingent praise and approval. An issue of research strategy is involved in the question whether different remedial pre-school programs are comparable for if they are, one group of programs could be used as control, while the experimental intervention takes place in others. If they are not, children in the same program must furnish both experimental and controls Ss at the risk of introducing a diffusion effect into the research design. Lastly, there is the question of the relevance of training techniques and measures used.

The language style of the lower class child has been described as characterized by grammatically simple and often unfinished sentences, poor syntactical form, simple and repetitive use of conjunctions, the inability to hold a formal topic through speech sequences, a rigid and limited use of adjectives and adverbs, etc. (Deutsch, 1965). In contrast, the elaborated language system that the lower class child is said to need in order to succeed in elementary school has been described as characterized by accurate grammatical order and logical modifiers, mediated through a grammatically complex sentence structure that makes frequent use of prepositions and impersonal pronouns and in which adjectives and adverbs are discriminately selected. While almost all studies of language development in lower class children make reference to the elaborated and restricted code formulation of Bernstein (1964), none make an effort to give explicit training in the attributes of an elaborated language system, nor do any of them measure the effectiveness of their intervention by tests that would reflect the structured properties of a child's language style. The Vocal Encoding subtest from the ITPA only counts the number of characteristics the child can enumerate in describing a simple object. The story telling test developed by Nelson (1968) scores reponses on a 5-point scale, ranging from simple object naming to a detailed theme. In neither case is grammar or syntax taken into consideration. Any measure that gives heavy weight to the number of words

spoken is particularly irrelevant to Bernstein's formulation, inasmuch as he has pointed out (Bernstein, 1964) that in a restricted language code the quantity of speech need not be affected.

In the present study, it soon became apparent that there was no one, fully satisfactory measure of language development. The story telling device used by Nelson (1968) approximates the requirements of such a measure but two pictures seemed to provide too small a sample of a child's language and the 5-point scale too gross a measure of his skill. Shriner and Sherman (1967) had devised a scale that placed heavy emphasis on length of response, while Sells, Cox, and Chatham (1967) developed a scale of language development that was inappropriate for use with pre-school children. The Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1961) has the advantage of standardization and the accumulation of a substantial literature. The fact that other studies used certain sub-tests from the ITPA also argued in favor of using it in the present work. On the other hand, the ITPA was primarily designed as a clinical diagnostic instrument for the detection of specific abilities and disabilities within an individual child and not as a basis for classification using a total composite score. Furthermore, the ITPA is organized around Osgood's (1957) "Static Model of Language Behavior," a specific psycholinguistic theory that is of limited relevance to a developmental point of view. Validity studies (McCarthy and Olson, 1964) have raised the question whether the Encoding tests do as their definition suggest, measure "the ability to put ideas into words or gestures."

Despite misgivings about the relevance of many of the ITPA sub-tests to the issue of verbal communication it was decided to include several of them among the measures for the present project so as to facilitate comparison with similar and related studies, such as those summarized by Bateman (1965). At the same time, it was deemed desirable to have a measure of verbal communication skills that would be more directly related to the goals and frame of reference of this study. For this reason a new testing procedure and scoring system, the Story Telling Test, was developed. This will be described in the following section.

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Method

Design

After taking base rate measures of verbal behavior, a group of pre-school children attending a Head Start program was divided into an experimental and a control group. The children in the experimental group participated in daily half-hour group sessions for a period of seven weeks during which they were given systematic language training, based on reinforcement principles. The children in the control group continued attending the regular Head Start program. Upon conclusion of the seven-week training period, the children in both groups were re-tested with the measures of verbal behavior used for the pre-test. Data analysis is based on comparisons between pre- and post-test scores.

Subjects

The original subject pool consisted of 36 children: 18 boys and 18 girls. Their mean age, as of the first day of the training phase, was four years, five months. Three of the boys and one of the girls were Caucasian, the rest were Negro. All of the children came from a semi-rural area in Suffolk County, New York. Their families are in the low income segment of the population.

The Head Start Center in which the study was conducted is one of several operated by the Economic Opportunity Council of Suffolk, Inc. It is located in a one-time residence on the main street of the County seat. In addition to the Director, the Center was staffed by four teachers, five teacher aides, four Youth Corps workers, a social worker, a nurse, a secretary, a community aide, as well as housekeeping personnel and a bus driver. The total enrollment during the period of the study was 60 children who were divided into four classrooms of 15 children each. The philosophy guiding the program was to provide informal experiences focused on learning the beginning concepts of language, numbers, music, physical education, and health that would, in the words of the Director, "pave the road to more formal learning." The program was guided by the intent to meet the needs of the individual child.

In order to obtain the subject pool of 36 children, a total of 42 children were initially screened, six were excluded from the study after

having been tested or partially tested because they had a severe speech defect (n=4) or exhibited excessively shy, immature behavior that precluded their participation in the training sessions (n=2).

The experimental and control groups were constituted by pairing children on the basis of sex, age, classroom, and whether they were in their first or second year of participation in the Head Start program. One member of each pair was then randomly assigned to the experimental group, the other to the control group. While the children had undergone pre-testing before these assignments were made, pre-test scores could not be used in the matching procedure because the time-consuming transcribing and scoring of the test protocols would have interposed several months between the testing and the beginning of training. It was deemed important to start the training as soon after pre-testing as possible. The mean pre-test scores for the experimental and the control group are shown in Table 3.

During the course of the project, two children left the Head Start program. As a result, there were 34 Ss (17 experimental and 17 control) available for data analysis. On the first day of the training phase of the study the mean age of the children in the experimental group was four years, four months, and in the control group four years, five months.

Measures

Illinois Test of Psycholinguistic Abilities (ITPA). Selected sub-tests of the Experimental Edition of the ITPA (Kirk & McCarthy, 1961) were administered to all Ss. In the order in which they were administered, the sub-tests used and the purpose of each, as stated in the Examiners Manual, were:

I. Auditory-Vocal Automatic Test.

"The purpose of this test is to sample Ss repertoire of grammatical rules. To this end, a sentence completion technique is employed; Ss task is to complete each test statement with a common, inflected word." E.g., "Father is opening the can. Now the can has been _____." The score is the number of items answered correctly.

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II. Auditory-Vocal Association Test.

"The purpose of this test is to assess Ss ability to relate verbal symbols on a meaningful basis -- in this case, by analogy. To this end, a sentence completion technique is employed; S is required to supply the analogous term." E.g., "I cut with a saw; I pound with a _____." The score is the number of items correctly completed.

III. Vocal Encoding Test.

"The purpose of this test is to determine the number of unique, meaningful ways in which S can verbally characterize a simple object like a ball or block. E presents S with an object and tells him to TELL ME ABOUT IT." The score is the number of acceptable responses given by S.

IV. Visual-Motor Association Test.

"The purpose of this test is to assess Ss ability to relate visual stimuli on a meaningful basis -- in this case, by relating pictures of common objects," or (for the first four items) by relating the objects themselves. E.g., wire hanger, nail, thread, and hammer are displayed and child is asked, WHICH ONE OF THESE THINGS (point) GOES WITH THIS (point to nail)? The score is the number of items answered correctly.

V. Auditory Decoding Test.

"The purpose of this test is to assess Ss understanding of the spoken word. It is a controlled vocabulary test." E.g., "Do babies eat?"; "Do biculcles drink?" The score is the number of items answered correctly.

Story Telling Test. This measure was developed specifically for this study. It consists of seven multi-colored pictures taken from pre-school picture books which depict scenes related to child life. Pictures A and B are used for modeling story-telling behavior, Picture C is a practice and warm-up card; only Pictures I through IV are used for scoring. The purpose of this test is to obtain a sample of the Ss verbal behavior under relatively standard conditions. The test was administered in the following manner:

After familiarization (see Testing Procedures), two female examiners

met with each S individually. The child was told that the three were going to play a story-telling game and asked to "watch how we do it first." For the first two pictures, story-telling was modeled for the child. One E would read the introduction to the story and the second E would complete it. She was then reinforced by the first E with statements like, "Good, that was a nice story." After the second modeling picture, the child was given the warm-up picture and told that "Now it is your turn." On this picture he was given as much encouragement and as many cues or questions as necessary to help him produce a story for which he could be given verbal reinforcement.

The four test pictures which were used for subsequent scoring were always presented in the same order. The E would read the short introduction to the picture after which S was given 60 seconds for "spontaneous speech." During this time E would make only such comments as, "Good," "Tell me more," etc. After passage of the first 60 seconds, E would ask the child a series of standard questions with the aim of eliciting further speech. A description of the seven pictures,[1] the introductory stems, and the eliciting questions follows:

Picture A. A postman in the cab of a mail truck. Introduced by: "____[2] knew that he would soon get a birthday package from his Aunt Beulah. One day the mail truck stopped in front of his house. ____ ran outside and guess what he said . . . . . "

Picture B. A girl in a barn with chickens, a dog and two horses, feeding sugar cube to one horse. Introduced by: "Helen lived on a farm. Every morning she went to the barn to visit her friends, the animals. What do you think she did this morning? . . . . . "

Picture C. A vendor on an ice cream truck waving to a boy and a girl who are eating ice cream. Introduced by: "One day _____ and _____ had money to buy ice cream. They saw the ice cream truck coming up the street, so they ran outside and what do you think they did? . . . . . "

Questions:
1. Where did they get the money from?
2. What kind of ice cream did they buy?
3. Who is this? (pointing to ice cream man).

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1 The sources of pictures were: A, C, and III - "The Truck and Bus Book" (Golden Shape Book). B, I, and II - "The Farm Book" (Golden Shape Book). IV - "Peter Goes to School" (Wonder Book).

2 The blanks were filled with the S's name or names of children familiar to him.

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Picture I. A boy and girl at a farm pond with cows, horses, duck and ducklings. Boy is fishing, girl is feeding duck. Introduced by: "One day _____ and _____ were playing at home and they got tired of all their toys. So _____ said to _____, let's go down by the water and play. When they got there, _____ threw his fishing pole into the water, and guess what happened? . . . . . "

Questions:
1. Did he catch a fish?
2. Who is this girl?
3. What is she doing?
4. What are these animals called?

Picture II. A rural school bus, filled with children, stopping near a farm to take on a boy and a girl. Introduced by: Every day when _____ goes to school, he has to take the school bus. On this day, what do you think happened? . . . . . "

Questions:
1. Why are they running?
2. Who is this girl? (standing in bus door).
3. Who are these kids?
4. Where are they going?
5. What od they do when they get there?

Picture III. A fire truck with firemen and Dalmatian, a boy waving and a dog running alongside . . . . . Introduced by: This little boy's name is _____. One day he heard the fire siren blow, so he ran outside. Then what happened? . . . . . "

Questions:
1. What is this? (fire truck).
2. Where is the fire truck going?
3. What is the little boy doing?
4. What is this? (dog running).
5. What is this? (dog on truck).

Picture IV. A little boy, cheerfully jumping out of bed. Sun rising outside window, bird on tree branch, and mother entering room, T-shirt and coveralls in hand. Introduced by: "One morning Peter's mother ran into his room and shook him, and told him to hurry up and get dressed, because

this was the big day that Peter had been waiting for . . . . . What do you think Peter did on this day?"

Questions: 1. What is Peter's mother saying to him?
2. Why was Peter so happy to get up?
3. Where was he going?

The child's entire verbal output during the Story Telling Test was tape-recorded and simultaneously taken down in writing by an assistant in order to assure as complete and clear a record as possible. Upon completion of the tests the research assistant prepared a transcription of the responses, using the tape recording, supplemented by the written record. One of the experimenters then checked the accuracy of the transcription and discrepancies were clarified by having E and the assistant go over the recordings together in order to reach agreement. The transcription was prepared according to the guidelines shown in Appendix A.

The reliability of the transcription procedure was checked by having the assistant and one experimenter independently transcribe the protocols of six, randomly selected Ss. The transcriptions were then compared and the number of discrepancies were counted. A discrepancy was defined as a disagreement in transcription, that is, (1) either a disagreement in number of words or information units transcribed (see Table 1), or (2) a disagreement as to the identity of a transcribed word where the difference would have affected the score. Reliability was calculated for each child using the formula: number of agreements/number of agreements + disagreements. The average reliability for transcription of words was .92, and for number of information units, .95.

The stories to each of the four test pictures were scored from the transcribed protocol by the assistant and the scoring was checked by one of the experimenters (see Appendix B). Scores were obtained for 21 categories (see Table 1) and summed across stories for each child so that 21 scores were available for each S.

The reliability of the scoring procedure was checked by having the assistant and one experimenter or both experimenters independently score the transcriptions for four, randomly selected Ss. The scoring was then compared and the number of agreements and disagreements were counted. Reliability was calculated for three major scoring clusters on each of the four Ss. The formula used was again the number of agreements divided

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by the number of agreements plus disagreements. The average reliabilities were:

For labeling relevant parts of speech (adjectives, nouns, conjunctions) .98.

For labeling predicates (Categories 7-11) .90.

For labeling grammatical units (Categories 12-19) .97.

Testing Procedure

Before any testing took place, all of the children who were to participate in the study, were given the opportunity to familiarize themselves with the two experimenters and the rooms in which testing and training were to take place. These rooms were situated on the otherwise unused third floor of the house in which the Head Start Center was located. They were sparsely but appropriately appointed with nursery school furniture and provided a setting in which the work of the project could be conducted without distraction. Familiarization was employed because the children had never visited the third floor or used the staircase leading up to it.

Familiarization consisted of bringing children upstairs in groups of five to seven. They played appropriate circle games (such as ring-around-the-rosy) for about 15 minutes in one of the rooms. They were then taken to the other room where the group sat around a table with the two examiners who proceeded to ask each child such questions as "Do you have a dog?" or "What are your brothers' names?" thereby eliciting some verbal behavior.

The period devoted to pre-testing lasted from June 19, 1968 to October 14, 1968. It had been the original intent to complete pre-testing within about a month but unforeseen changes in vacation schedules of the children and other unavoidable delays and suspension of testing during August and part of September, caused pre-testing to span almost four months.

Each child was tested individually, the tests lasting at least two sessions. One session was devoted to the administration of the ITPA and another session to giving the Story Telling Test. Occasionally when a child seemed to tire, became distracted or refused to continue, testing was interrupted and the child brought back on another day to finish the

test.

Upon completion of the training phase of the study, all children were re-tested with the children in the control group again going through the familiarization procedure described above. Post-testing began on December 6, 1968 and was completed on January 10, 1969.

Training Procedure

The training phase of the project ran from October 15, 1968 to December 3, 1968. There were 27 training days with four training days in Weeks 1 through 4, and 6; three training days in Week 5; and two training days each in Weeks 7 and 8. Holidays and school vacation made it impossible to maintain an even distribution of training days for all weeks.

The original 18 children in the experimental group were initially divided into three groups of six children each. Routine demands of the Head Start program, such as visits to the dentist and snack time, as well as absences of individual children, made it impossible to adhere to this grouping so that on any individual day children were taken into the training sessions in varying groups from between four to six Ss. There were on the average 2.6 absences per day in the experimental group, the number of absences ranging from 0 to 7. On the average, each subject was absent 4.2 days out of the 27 training days, the number of days missed ranging from 0 to 17 days. One of the children in the experimental group left the Head Start program because of illness so that a total of 17 children completed the training phase.

During the period when the children in the experimental group participated in the training procedures, the children in the control group continued in the regular Head Start program. They would see the experimenters entering and leaving the classroom and they often spoke to them but there was no formal contact. The teachers had not been informed of the exact nature of the study. They knew that the experimenters were interested in language but thought that they were giving some type of speech therapy to the children in the experimental group.

The children were taken to one of the rooms with which they had been previously familiarized where they sat around a table with one of the Es and participated in various activities designed for the development of

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language skills. There were three explicit training goals. Training goal I was to increase the use of adjectives. Training goal II was to increase the complexity of verbal communication through the expression of temporal and causal relationships. Training goal III was to increase the correct use of verbs, particularly in terms of singular and plural form and past and present tense. In each daily session three different tasks, one for each training goal, were presented; on any one day all training groups worked on the same tasks. The two Es, who alternated training days, followed a master plan and kept in close contact with each other.

It was decided that for the first six training days social reinforcement in the form of praise statements would be sufficient reward. The children also received Language Lotto picture cards contingent on correct responses, a standard procedure with that game. On the seventh training day additional reinforcements were introduced in the form of small, colored, plastic discs which served as tokens. The children were told that they would receive these tokens for good work and that at the end of each session, they could "buy" something from the "make-believe store" that had been set up in one of the closets. The children were expected to take turns speaking and received a token each time they performed correctly. Language Lotto continued to be used with only social reinforcement because "winning" a picture card for a correct response clearly seemed to serve as a reinforcer in its own right. At the end of each session each child exchanged all of his tokens for one prize which he could select from a frequently changing collection of four to six items such as trinkets, toys, chewing gum, and candy. This procedure was followed for the remainder of the program.

In general, each task was introduced by direct teaching in which the experimenter modeled appropriate verbalizations. Each child was given the opportunity to respond to the task and every appropriate response earned a token. If the child was unable to make a correct response, additional modeling cues were supplied by the experimenter or another child.

Training Materials. The game Language Lotto (Appleton-Century-Crofts) was used every day. This game has six units: Naming Objects, Prepositions, Actions, More Actions, Compound Sentences, Relationships. A different unit was used each week, two weeks being spent on Compound Sentences. The use of this tool followed the instructions contained in the Teacher's Manual (Gotkin, 1966).

In addition to Language Lotto, different materials were used for each of the three training goals, as follows:

For training goal I (adjectives) every day objects, modeling clay, and the Teaching Pictures published by the David C. Cook Company, were used. For training goal II (complexity), See-Quees, series 4 and 6 (The Judy Company, Minneapolis), Sequential Pictures (Development Learning Materials), and a small collection of puppets were used. For training goal III (verbs), See-Quees, puppets, and Learning Action Words (Kenworthy Educational Service, Buffalo) were used. In addition, the experimenters made reference to a child's own actions and actions engaged in by the experimenter or by other children. See Appendix C for examples.

Results

The three explicit training goals that had guided the training sessions were:

I. to increase the use of adjectives.
II. to increase the complexity of verbal expression.
III. to increase the correct use of verbs.

Implicit in the above is a fourth goal, an increase in the variety and number of words produced.

Story Telling Test

The system that had been devised for scoring the Story Telling Test included categories and combination of categories designed to test the extent to which the above goals were reached. For purposes of analysis, certain categories were combined. This was done, in part, because some categories were scored so infrequently that meaningful analysis was impossible. The main consideration in collapsing categories, however, was one dictated by the logic of the overall aim of the project. If one wishes to evaluate whether verbal communication skills have increased, it makes sense to look for increase in any kind of sentence (sum of categories 14 through 18), and to count compound, complex, and compound-complex sentences (categories 16, 17, and 18) together. The only scoring categories not used in the data analysis were Fragments (category 19) and Discontinuous speech (category 20). The incidence of these was too low

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and there was no logical basis for pooling the entries for these with those of any other category.

The data were evaluated by obtaining the mean differences between pre-test and post-test for the experimental group and for the control group and comparing these differences. The basic statistic was the t-test for independent samples.[3] The appropriateness of this statistic had been assessed by testing data for normality of distribution using Chi Square for goodness-of-fit and for homogeneity of variance using the F test. Inasmuch as test scores had not been one of the criteria by which subjects had been assigned to experimental and control groups, the t-test for independent samples was used after it had been ascertained that the correlation of scores for matched Ss of the two groups was negligible on two of the measures for which correlation coefficients had been obtained. ("All Sentences" $r = -.44$; "Words per Unit" $r = .18$).

An overview of the main results, as well as a listing of the measures used to assess the extent to which the various training goals were reached, can be found in Table 2. A comparison between experimental and control groups revealed a significant change at or below the .05 level only in the decreased number of omitted verbs. Although this represents an important improvement in a child's language, the fact that no differences emerged in any of the other scoring categories is disappointing. Inspection of the data revealed that a pronounced sex difference was responsible for this result. When separate analyses for boys and girls were undertaken, it was found that the boys in the experimental group had changed significantly in the predicted direction on measures relevant to all but one of the training goals. They were using more adjectives, constructed sentences of greater complexity, and produced more words. Only on the measure of verbs did they fail to show greater improvement than the boys in the control group. The data for girls, on the other hand, revealed that the three significant changes all favored the control group. The unexpected improvement of the girls in the control group relative to the change of the girls in the experimental group, vitiated improvements in the experimental group. They also acted to obscure differences when the results of the girls were pooled with the results of the boys, making for the disappointing overall results.

The data are presented in greater detail in Tables 3 (All Children), 4 (Boys), and 5 (Girls) where group means for pre-test and post-test on all measures, as well as mean differences and magnitude of t are shown.

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3 For formula used, see Appendix D.

On most measures the experimental group showed greater changes in the predicted direction than the control group but the fact that the results for the girls take the opposite direction obscures this finding. This paradoxical effect can be illustrated with the measure "Total Number of Words." Here the boys in the experimental group showed mean increase of 50.11 from pre-test to post-test, while the boys in the control group had a mean decrease of 62.50, a difference that is highly significant ($p < .01$). For the girls, on the other hand, the experimental group had a mean increase of 17.875, compared to a mean increase by the control group of 111.22, the difference being significant at the 5 per cent level of confidence. Because these results are in opposite directions, pooling the data for boys and for girls and evaluating the changes for all children results in an insignificant difference in favor of the experimental group.

Illinois Test of Psycholinguistic Abilities (ITPA)

Comparison between experimental and control group changes from pre-test to post-test for the data obtained with the ITPA failed to reveal significant differences when the t-test was applied, although significance was approached for Vocal Encoding, sub-test III (see Table 6). Because this had been the only sub-test for which the test of homogeneity of variance did not satisfy the assumption underlying the t-test, non-parametric techniques (Sign Test and Wilcoxon Test) were appled to the data. These tests revealed that sub-test III differentiated at the 5% level of confidence between experimental and control groups.

For this sub-test the differences between pre-test and post-test scores were also evaluated by using the Standard Error of the test as presented for the various age levels in the test manual. According to the criterion by which a significant change in score is defined as one that is greater than plus or minus the Standard Error, it was found that 14 out of the 17 children in the experimental group obtained significantly higher scores ($p < .01$) while only eight of the 16 control children had an improvement of that magnitude ($p = .60$).

When the pre-test scores on sub-test III were compared with the data from the standardization group, it was revealed that they had a mean score that was .58 standard score units below the mean for the relevant age levels as given in the Manual (Kirk and McCarthy, 1961). For the children in the experimental group, this difference was -.415; for the children in the control group, it was -.790. After the training phase, the mean

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post-test score for all 33 subjects was .627 standard score units above the standardization group mean for the respective age levels. For the experimental subjects this difference was +.992; for the control subjects it was +.239. Thus, while the scores of all children improved relative to the standardization norms, the children in the experimental group achieved a reliable gain of almost one standard score.

Age Differences

Because the children in the sample ranged in age from 3 years 4 months to 4 years 10 months, a comparison of mean difference scores for the older vs. the younger children was carried out. Working only within the experimental group, the scores of the six oldest children, ranging in age from 4 years 9 months to 4 years 10 months, were compared with the scores of the seven youngest children, ranging in age from 3 years 4 months to 4 years 2 months. While 12 of the 17 comparisons of means were in favor of the older children, the only differences significant at the 5% level of confidence, were found on two measures relating to word production. These were in total number of words (t = 2.416) and number of spontaneous words (t = 2.66). A difference at the same level of significance was also found on ITPA sub-test I (auditory-vocal automatic test) where the t-value was 2.21. In each instance, these differences were in favor of the older children, suggesting an interaction between age and ability to benefit from a language training program.

Discussion

The approach to increasing verbal communication skills in culturally disadvantaged pre-school children that guided the present study was based on brief, intensive training sessions with small groups of children using principles of reinforcement to teach aspects of language following an explicit eight-week program. This particular approach employed by two white, female psychology graduate students, time-limited as it was, appeared successful with the boys in this study. They clearly increased their word production and employed more words per information unit. Their language also became more complex, found expression through a greater number of sentences, and took on a more mature form as evidenced by the significant decrease in the use of primitive labels (tacts). In addition, the language of the boys became more descriptive, as indicated by the significant increase in adjective-noun ratio. These results thus confirm those of

Nelson (1968) whose findings tended to show that explicit reinforcement of language behavior enhanced the verbal skill of children. Unlike Nelson, however, the present project focused the training sessions on specific aspects of language and used a more elaborate system of scoring a story telling test.

The results for the boys in the present study contrast markedly with the findings of Vance (1967) and Mitchell (1967) who reported essentially negative results. This difference may be due to the explicit nature of our training, the reinforcement procedure, and the specificity of our Story Telling Test scoring procedure. Unlike previous studies that were summarized in the Introduction to this report, the present scoring system was closely related to the training goals which, in turn, guided the content of the training sessions. Previous studies had used vocabulary tests, gross measures of story quality, or the ITPA with negative or equivocal results.

In order to assess the effectiveness of a given intervention, such as a language training program, the tests used before and after that intervention should measure the behavior that is the object of the intervention. Thus, if children are taught to increase the descriptive quality of their speech, measures of rote memory span, as the sequencing tests of the ITPA, would seem to have little relevance and should not be expected to show the effect of the training program. While a measure should be relevant to the behavior which is the focus of the intervention, it should, in order to be meaningful, not be so specific as to assess changes only in the specific responses that were practiced during training sessions. In other words, the measure should demand both stimulus and response generalization along a relatively limited dimension of dissimilarity. Following this reasoning, we used a story-telling test but did not train specifically for story-telling skill. The measures used thus demand some generalization without being so far removed from what the children were taught as to fail reflecting the effect.

The considerations discussed above are illustrated by the results of the various sub-tests of the ITPA. What differences we did find emerged on the one sub-test (Vocal Encoding) that reflects the number of words a child uses in describing various simple objects, a kind of verbal behavior

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that is related to training goal I -- Adjective -- which called for rehearsal of such statements as "The sponge is soft; the block is hard." On the other hand, we found no significant changes on the sub-test that measures a child's ability to relate visual stimuli (Visual-Motor Association Test) by asking about a series of objects, "Which goes with what?" No aspect of the training program had dealt with behavior of this kind.

Based on this reasoning, we should have found significant changes in the scores for the ITPA Auditory-Vocal Automatic Test, a measure of grammatical rules using a sentence completion technique, inasmuch as the focus of training goal III -- Verbs -- had been on the correct grammatical form of verbs and predicates. The effect of this training is not reflected in significant changes in scores on this ITPA sub-test, nor did an effect emerge on relevant measures from the Story Telling Test. The measure relevant to training goal III that did show a significant improvement on the part of the total training group was a decrease in verb omissions. It thus appears that while the training effort failed to effect changes in the more refined aspects of grammatical correctness, it did succeed in reducing the incidence of such primitive constructions as "They horses." Since verbs and predicates must be produced before they can be produced correctly, that is, a response must be emitted before it can be shaped, this result makes sense both from a logical and developmental point-of-view.

While the results for the boys in our samples were in the expected direction, the findings for the girls were unexpected and paradoxical in that the three story-telling measures on which the mean differences attained the conventionally acceptable level of significance revealed a greater improvement for the control than for the experimental group. While the girls in both groups increased in number of words used, those in the control group did so to a significantly greater degree. The same effect was found on the measure reflecting the increased use of compound-complex sentences, while on the measure "adjective/noun ratio," the girls in the experimental group actually registered a small mean decrease which, in comparison to the increase by the control group makes the difference significant in favor of the latter.

While it is impossible to explain these contrary results with any degree of certainty several possibilities can be suggested. The girls had generally higher pre-test scores than the boys, reflecting the usual advance

in language development found in girls at this age level. In working with the children, the experimenters also had the distinct impression that the girls were brighter, more alert, and apparently more intelligent than the boys. These factors may have resulted in the girls responding more favorably to the total Head Start program so that the increment provided by the experimental language training program failed to make an impact. Comparisons between experimental and control girls thus showed significant differences in favor of the control group but on only three out of 14 measures, while in the case of the boys, seven measures revealed a significant effect in favor of the experimental group.

Another feature that emerged in comparing the results for the boys with those for the girls is that in the case of the boys some of the significant differences were contributed to by decreased mean scores for the controls. This is particularly true for the measures of word production, suggesting that while the Head Start experience may have enhanced the language skills for the girls in our sample, it actually depressed or retarded some aspects of language behavior for boys.

The possibility that there is a differential effect depending on the sex of the children leads to another, more plausible explanation for the results of the present study. It will be recalled that the experimenters who acted as teachers for the training groups were female and that the children participated in groups of both boys and girls. While token and back-up reinforcers were used to strengthen desired verbal behavior, social reinforcement invariably accompanied the dispensing of tokens and was, in fact, the only reinforcer during the first six training sessions. Studies by Gewirtz, Baer, and Roth (1958) and Stevenson (1961) have demonstrated a cross-sex effect for social reinforcement; social reinforcement delivered by a female adult is more effective with boys, while a male reinforcing agent seems to be more effective with girls. It is conceivable that a cross-sex effect operated in our study, resulting in the training sessions being a more potent intervention for the boys than for the girls. This possibility clearly suggests the need for a language training study in which sex of experimenter is systematically varied. Should this variable prove to be effective, such a finding would point to the desirability of having male teachers participate in Head Start and other pre-school training programs.

While this study was in progress the report on the impact of Head Start conducted by the Westinghouse Learning Corporation and Ohio

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University (1969) became available. Among the recommendations contained in that report is one for concentrating pre-school programs on the remediation of specific deficiencies, such as language deficiencies. The results of our project regarding the boys, would seem to lend support to this recommendation. Non-specific, unsystematic programs that do not make an explicit effort to teach specific skills but concentrate instead on "positive interpersonal experiences" (Minuchin and Biber, 1968) would seem to have little effect on crucially adaptive language skills.

The present study was designed to test only the short-range effectiveness of a systematic language training program based on reinforcement principles. It therefore is in no position to answer the important question whether any of the changes in language behavior that emerged were of more than temporary nature or whether the benefit would be of such long-range effect as to sustain the children through entrance into elementary school and the years beyond. Only carefully conducted follow-up research can furnish the answer to this question. In all likelihood, a brief eight-week program such as the one conducted in the present study can hardly be expected to have a lasting effect unless efforts are made, designed to foster and build on the improvements resulting from such an intervention. If the kind of training program we conducted for a brief period could be extended over the entire time a child is enrolled in Head Start, the possibility is high that this would, indeed, give him a head start toward obtaining maximum benefit from his later school experience. Whether this assumption is correct, remains another issue for future research.

Table 1

Scoring Categories for Story Telling Test

Category	Description
1. Spontaneous Words	The number of words spoken by S during the first 60 seconds after presentation of a picture, before E asked the standard questions.
2. Total Words	All story-related words emitted after E's introduction to each picture.
3. Information Units	Any word or combination of words, regardless of length or grammatical structure that transmits a meaningful message.
4. Words per Unit	The ratio of $\frac{\text{Category 2}}{\text{Category 3}}$
5. Adjective/Noun Ratio	Uses standard grammatical definition of adjective and noun.
6. $\frac{\text{Conjunctions other than "and"}}{\text{Total Conjunctions}}$	A ratio reflecting diversity of mature conjunctions used in story.
7. Correct Single Verbs 8. Correct Multiple Verbs 9. Incorrect Single Verbs 10. Incorrect Multiple Verbs	The verb scores reflect the complexity of the predicate and grammatical correctness. (See Appendix B for examples). Each score is a ratio of the Category to the sum of categories 7-11.
11. Incorrect Verb Omissions	Scored when a predicate is obviously missing and the addition of a single verb would produce a sentence.

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Table 1 (Continued)

12.	Tacts	A label, usually a noun, verb, or prepositional phrase, but no modifier. The score for this and the following seven categories is a ratio of the category to the sum of categories 12-19.
13.	Elaborated Tacts	A tact with a modifier.
14.	Simple Sentences	Subject, predicate, and object.
15.	Modified Simple Sentences	A simple sentence with a modifier, such as an adjective, adverb, prepositional or infinitive phrase.
16.	Compound Sentences	Statements containing two or more independent clauses.
17.	Complex Sentences	Statements containing an independent and one or more dependent clauses.
18.	Compound-Complex Sentences	Statements containing two or more independent and one or more dependent clauses.
19.	Fragments	An interrupted message ("train of thought") that is not completed.
20.	Discontinuous Speech	Stutters and repetitions.
21.	Variability	This score reflects the number of different words the child used across all stories. Obtained by dividing all words into units of 30, counting the number of different words in each unit, deriving a ratio by dividing the number of different words by 30, and averaging these ratios.

Table 2

Training Goals, Measures, and Summary of Results

Training Goals	Measure	Category	Significance of pre -vs. post-test differences (p for t-tests)		
			All Ss	Boys	Girls
I Adjectives	Adj./noun ratio	5		.05[a]	.05
II Complexity	Words per unit	4	.10[a]	.001[a]	
	Elab. tacts & modif. s.s.	13 + 15			
	Decrease in tacts & elab. tacts	12 + 13		.05[a]	
	All sentences	14 + 18		.05[a]	
	Compound and/or complex sentences	16 to 18		.05[a]	.05
	Not "and" Conjunctions	6			
III Verbs	Correct verbs	7 + 8			
	Single verbs	7 + 9			
	Multiple verbs	8 + 10			
	Decrease in verb omission	11	.05[a]		
Word production	Total Words	2		.01[a]	.05
	Spont. words	1		.05[a]	.10
	Variability	21	.10	.10	

[a] Difference in predicted direction, i.e., improvement in favor of experimental group.

Table 3

Group Means and Difference Tests -- All Children

Measure	Experimental Group Means			Control Group Means			
	Pre-test	Post-test	Diff.	Pre-test	Post-test	Diff.	t_D [a]
Words per unit	3.954	4.923	.969	4.735	4.860	.125	1.313
total # words	209.29	244.24	34.950	243.29	272.76	29.47	.142
spont. words	134.24	177.65	43.41	151.12	188.65	37.53	.007
variability	.658	.643	-.015	.610	.633	.023	1.472
adj./noun	.261	.304	.043	.267	.343	.076	.589
correct verbs	.626	.680	.054	.592	.652	.060	.068
single verbs	.542	.628	.086	.481	.638	.157	.829
mult. verbs	.351	.336	-.015	.406	.294	-.112	1.196
omitted verbs	.107	.036	-.071	.112	.068	-.044	1.708*
cat. 14...18	.456	.553	.097	.494	.503	.009	1.165
cat. 13 + 15	.448	.498	.050	.380	.399	.019	.941
cat. 16 + 17 > 18	.040	.059	.019	.072	.119	.047	.881
not "and"/all conj.	.168	.129	-.039	.172	.163	-.009	.253
cat. 12 + 13	.534	.434	-.100	.487	.483	-.004	-1.254

Note. -- All differences are in positive direction unless preceded by minus sign.

[a] $\underline{d.f.} = 32$

* $\underline{p} < .05$

Table 4

Group Means and Difference Tests -- Boys

Measure	Experimental Group Means			Control Group Means			
	Pre-test	Post-test	Diff.	Pre-test	Post-test	Diff.	t-[a] D
Words per unit	3.721	4.788	1.067	4.658	3.680	-.978	-3.061**
cat. 13 + 15	.428	.492	.064	.377	.371	-.006	.842
cat. 16 + 17 + 18	.026	.056	.030	.070	.043	-.027	1.996*
single verbs	.572	.598	.026	.427	.519	.092	.563
cat. 14...18	.408	.554	.146	.475	.392	-.083	1.987*
adj./noun	.238	.325	.087	.223	.197	-.026	2.385*
cat. 12 + 13	.584	.437	-.147	.506	.602	.096	-2.097*
not "and"/all conj.	.180	.142	-.038	.100	.203	.103	-.841
multiple verbs	.294	.355	.061	.455	.405	-.050	.997
omitted verbs	.134	.047	-.087	.118	.075	-.043	-.587
total no. words	182.22	232.33	50.11	246.00	183.50	-62.50	2.746**
spont. words	114.22	163.78	49.56	148.12	120.75	-27.37	2.527*
variability	.649	.643	-.006	.571	.626-	.055	-1.393
correct verbs	.612	.688	.076	.529	.631	.102	-.231

Note. -- All differences are in positive direction unless preceded by minus sign.

[a] d.f. = 15

*p < .05.

**p < .01.

Table 5

Group Means and Difference Tests -- Girls

Measure	Experimental Group Means			Control Group Means			
	Pre-test	Post-test	Diff.	Pre-test	Post-test	Diff.	t-[a] D
words per unit	4.216	5.075	.859	4.803	5.910	1.107	-.244
cat 13 + 15	.470	.505	.035	.383	.425	.042	-.0005
cat. 16 + 17 + 18	.056	.064	.008	.074	.186	.112	-2.317*
single verbs	.509	.662	.153	.530	.744	.214	.490
cat. 14...18	.510	.553	.043	.512	.603	.091	-.900
adj./noun	.287	.280	-.007	.306	.472	.166	-1.975*
cat. 12 + 13	.477	.430	-.047	.471	.378	-.093	.567
not and/all conj.	.154	.114	-.040	.237	.127	-.110	.426
multiple verbs	.415	.314	-.101	.363	.196	-.167	.581
omitted verbs	.076	.024	-.052	.106	.061	-.045	-.135
total no. words	239.750	257.625	17.875	240.89	352.11	111.22	-1.850*
spont. words	156.75	193.25	36.50	153.78	249.00	95.22	-1.448
variability	.669	.643	-.026	.645	.640	-.005	-.691
correct verbs	.642	.672	.030	.648	.670	.022	.092

Note. -- All differences are in positive direction unless preceded by minus sign.

[a] $\underline{d.f.} = 15$

*$\underline{p} < .05$ (in favor of control group)

Table 6

Group Mean Scores for Illinois Test of Psycholinguistic Abilities.

Subtest	Control Group Pre-test	Control Group Post-test	Control Group Diff.	Experimental Group Pre-test	Experimental Group Post-test	Experimental Group Diff.	t-D	All Subjects Pre-test	All Subjects Post-test
I Raw Score	3.31	3.81	.50	3.76	4.47	.71	.288	3.54	4.15
Standard Score	-1.22	-1.08		-1.07	-.86			-1.14	-.97
II Raw Score	6.47	8.33	1.86	6.76	9.53	2.77	.957	6.62	9.09
Standard Score	-1.03	-.49		-1.03	-.21			-1.03	-.34
III Raw Score	6.94	11.19	4.25	8.65	14.47	5.82	1.414*	7.82	12.88
Standard Score	-.79	.24		-.41	.99			-.58	.63
IV Raw Score	10.50	11.86	1.36	9.12	9.24	.12	.782a	9.74	10.42
Standard Score	.07	.43		-.30	-.25			-.13	.06
V Raw Score	11.36	13.71	2.35	13.80	14.47	.667	.698a	12.62	14.10
Standard Score	-.50	-.05		-.08	.07			-.02	.01

* $p < .10$

[a] Difference in favor of control group

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Appendix A

Guidelines for Transcribing Stories

Content

1. Transcribe only words, including stutters, but not partial words.

2. Transcribe only those verbalizations which occur after E's introduction.

3. Do not transcribe irrelevant comments. That is, if content is not related to story, omit.

4. If verbalization is result of E's request for clarification, omit if it is repetitious. If verbalization includes some new material, transcribe.

e.g. Child: "That's a horsey."
E: "What did you say"?

Child: "That's a horsey." Child: "I said, 'That's a horsey'."

omit omit

Child: The boys are on the horsey.

transcribe

Style

1. Fragments are indicated by a dash.

2. Use quotation marks when appropriate.

3. Discontinuous are indicated by parentheses, repetitious by commas.

4. When tape is unclear, transcribe maximal information, i.e., number of

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Appendix A (Continued)

words, parts of speech. (Unclear words are not counted for variability score).

e.g. The child _____ to the _____.

In cases where no, or almost all, content is not available, indicate with _____? _____. However, do not count as a unit.

Appendix B

Guidelines for Scoring Stories

Counting

In word count, count all words including discontinuous. Contractions are counted as two words. Do not count discontinuous words in any scoring units, for example, in adjectives or conjunctions. Do count discontinuous when scoring variability.

ex: Their, their, their book. Four words in word count and in in variability. One noun, one adjective.

ex. of contractions: Don't = do not = one verb, adverb.
Can't = cannot = one verb.
I'm going = I am going = one pronoun, two verbs.
Ain't = one verb = incorrect verb.

Miscellaneous: Fireman = one word.
Mailbox = one word.
Notebook = one word.
School bus = one adjective, one noun.
Fire truck = one adjective, one noun.
Fire engine = one adjective, one noun.
Fire dog = one adjective, one noun.
Fire house = one adjective, one noun.
Mary Ann = one noun = one word.

Verbs (Categories 7-11)

The verb score reflects the complexity of the predicate and the grammatical correction of it. In general, score predicates but not necessarily all verbs. Score only when a subject exists:

e.g. He says _____. Score

Saying, "Get up!" Score "Get up!" Do not score "saying."

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Appendix B (Continued)

Do not score infinitives.

Category 7. Correct single: He went home. They are home.

Category 8. Correct multiple: He is going home. They are playing at home.
They finished jumping. They will play.
I don't know. I have kept.

Category 9. Incorrect single: He get the car. Their children goes.

Category 10. Incorrect multiple: He getting the car. Their mommy saying.

Category 11. Omission: Scored when a predicate is obviously missing and the addition of a single verb would make it a sentence.

e.g. Two fish in the water. That not me.
This my book.

A child may verbalize a descriptive statement with no verb; in this case, do not score Category 11. Usually this involves a tact or an elaborated tact and comes after 60' in answer to a direct question.

e.g. E: "What kind of animal is this?"

Child: The big cow there.

TACT (Category 12)

A tact is a simple verbalization which can best be described as a label. It consists most often as a noun, one single or multiple verb or prepositional phrase.

ex: a dog — Contains no modifier.
and a fish
to the school
playing
feeding the duck

Appendix B (Continued)

Elaborated Tact (Category 13)

Any tact with a modifier, the modifier being defined as adjective, adverb, introjection, prepositional phrases, infinitive phrases. A tact with a compound subject or predicate is an elaborated tact.

ex: a big dog
to the red school
playing with the dog
feeding the duck and the chickens
learning to read

Simple Sentence (Category 14)

A Ss. contains a subject, predicate, object (direct or indirect). When introduced by conjunction, count as Ss when above is fulfilled.

e.g. and a horse ate.

Sentences with modifiers are not Ss. except when modifier is a negative.

e.g. I don't know. "Yes," "no," "uh-huh," are Ss.

Modified Simple Sentence (Category 15)

A modified Ss. is a Ss. which contains a modifier, i.e., adjective, adverb, prepositional phrase, infinitive phrases, apposition (except when adjective is a predicate nomination). A Ss. with a compound subject is a modified Ss. A Ss. can also be elaborated by a tact or elaborated tact.

e.g. I know, Kevin. And a big horse ate. He is going to school. I gonna eat and run (infinitive and compound). He went home. (Note: "went" is intransitive, takes no object, so "home" is an adverb).

Compound Sentence (Category 16)

Verbalization which contains two or more independent clauses.

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Appendix B (Continued)

Complex Sentences (Category 17)

Verbalization which contains an independent and one or more dependent clauses. Note that many quotations within a unit are often dependent clauses.

e.g. John said, "Look at the bird."

When quote is interjection (e.g., he said, "Hi"), score as Simple Sentence.

Compound-Complex (Category 18)

Contains two or more independent clauses and one or more dependent clauses.

Fragments (Category 19)

A fragment is defined as an interruption of a train of thought which isn't returned to. (Do not include corrections. Do not score unit with correction in it, i.e., score only corrected unit).

e.g. The fire _____. He has a hat on.

Example of a correction: The fire, no -- the boy, has a hat on.

Discontinuous (Category 20)

Discontinuous speech is defined as a stutter or repetition.

e.g. He, he went to school.
The girl was playing and, and, and eating.
The big truck, the big truck, went fast.

Variability (Category 21)

The variability score reflects the number of different words the child used across all stories. It is obtained by (1) dividing all words into

Appendix B (Continued)

units of 30; ignoring surpluses of multiples of 30. Contractions are counted as one word. Count discontinuous. (2) Counting number of different words for each unit of 30. (3) Average across units of 30 (so 30 is the denominator).

Calculations

General Rules:

Each story is scored as a separte entity except for variability (to calculate variability, see "Variability"). Convert fractions into three place decimals.

Verbs: To calculate ratio for verbs, add Categories 7-11 and use this sum as the denominator.

Categories: To calculate ratio for categories, add Categories 12-19, and use this as the denominator.

Discontinuous: Total number of words is used as the denominator in the ratio.

Miscellaneous Hints in Scoring

Parts of Speech

Possessive pronouns, when standing alone, are pronouns. When they precede a noun, they are adjectives.

ex: It is his.	pronoun
It is his book.	adjective

"One" is always considered a pronoun.

That is a mama.	pronoun
There it is.	adverb
He squandered his all.	noun
All kids.	adjective

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Appendix B (Continued)

All the kids.	adjective
You all.	pronoun
All of the kids.	pronoun
All of us.	pronoun
Nothing, something	noun
In there.	noun
Right here.	adverb
That is why.	noun
Somebody, someone, everyone, everything	pronoun
Something	noun

"And you know what?" Ss. d (incorrect multiple). Score as "Do you know what?"

"You know, that's a fish." "You know" not a separate clause. Thus, score a correct single. Category is modified Ss.

"Know what, that's a cat." Score as command. A correct single. Category: Modified Ss. Know who _____. Score as command. A correct single. Category: Complex .

"Get dressed!" Get: verb. Dressed: verb.
"Get ready!" Get: verb. Ready: adjective.
He got dressed up. Got dressed: verb.
I am dressed. Dressed: adjective.
He is named John. Is named: two verbs.
The boy named John went. Named: adjective.
A girl like her. Like: preposition.
I like her. Like: verb.
Do like I do. Like: conjunction.

Appendix C

Details of Training Program

I. Training Goal - Adjectives

A. Pairs of adjective trained

1. old vs. young
2. near - far
3. round - square
4. soft - hard
5. colors
6. long - short
7. small - large
8. smooth - rough
9. skinny - fat
10. glass - wood - paper
11. crooked - straight
12. adjective comparison

B. Materials used

1. real objects (e.g. "Which one is long?" "This is long.")
2. clay (e.g. "What did you do to the clay?" "I made it round.")
3. pictures (David C. Cook Company - Teaching Pictures); (e.g. "Find something red.")

II. Training Goal - Complexity

A. Temporal "I _____ then I _____." "Often I _____ then I _____."

B. Causal "Why _____? Because _____."

C. Materials

1. Judy Company See-Quees (e.g. "Why did Miss Muffet run away?" "Because she saw a spider.")
2. Actions the child did (e.g. "Why did you throw the kleenex away?" Because you told me to." (Developmental Learning Materials)

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Appendix C (Continued)

4. Puppets (e.g. "Why did Mr. Monkey go to the store?")

III. Training Goal - Verbs

A. Kinds of verbs trained

1. singular vs. plural. "They <u>are</u> ____." "He <u>is</u> ____."

2. past vs. present. "What <u>is</u> he doing?" "What <u>was</u> he doing?"

B. Materials used

1. Judy Company See-Quees (e.g. "They <u>are</u> waiting for the bus." "She <u>is</u> running away.")

2. Actions done by the experimenter and by children (e.g. "What am I doing?" "You are clapping." "What is he doing?" "He is clapping."

Appendix D

Formula for t-test for Independent Samples

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{\frac{\Sigma x_1^2 - \frac{(\Sigma x_1)^2}{N_1} + \Sigma x_2^2 - \frac{(\Sigma x_1)^2}{N_2}}{n_1 + n_2 - 2}\left[\frac{1}{n_1} + \frac{1}{n_2}\right]}}$$

$\underline{d.f.} = n_1 + n_2 - 2$